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Front-line Recurrent Nova Science Requires Century Old Data

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The identity of the progenitor systems for Type Ia supernovae has been a big problem for forty years. This has recently risen to high importance for all the supernova cosmology programs where the progenitor needs to be known for evolution corrections. A likely progenitor is the recurrent novae (RNe), in which a near-Chandrasekhar mass white dwarf is being loaded with material at a high rate. But there are two big questions for RNe as progenitors; first whether the RN death rate equals the supernova rate and second whether the white dwarf is gaining mass over each eruption cycle. For these two questions, three parameters are required to be measured for many RNe; the recurrence time, the discovery efficiency, and the pre-eruption orbital periods. Previously, these quantities have factor-of-3 errors, two orders-of-magnitude errors, and complete lack of information, respectively. The only way to find these values is with archival data. For the recurrence time, I have exhaustively searched the world's archival plate collections and other archival records and have found seven previously-undiscovered eruptions. For the discovery efficiency, I have searched for second eruptions of 'classical novae', quantified the limits and observing cadences of archival plates, all LMC and M31 nova searches, and amateur nova hunters from 1890 to present, and tested archival data of old 'classical novae' for RN indicators. My conclusion is that roughly one-third of all 'classical novae' are really RNe with two-or-more eruptions in the last century. The only way to get pre-eruption orbital periods is with old archival data, for which I now have highly accurate period changes across eruptions for two RNe